Ecological site AX004A01X005
Isomesic Udic Alluvial Terrace Forest

Last updated: 5/02/2025
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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 004A–Sitka Spruce Belt

This area consists of a long and narrow band of marine terraces, coastal estuaries, sand dunes, low relief hills, and mountain slopes that parallels the Pacific Ocean. This area is entirely within the Pacific Border Province of the Pacific Mountain System in Oregon and Washington. In Washington, this area ranges in elevation from sea level to a maximum of 1800 feet (550 meters) inland. The portion of this area in northern Washington consists primarily of glacial deposits, with some scattered young Tertiary sedimentary rocks. The climate is cool and moist, with minimal changes between seasons. Summer temperatures are moderated by the proximity of cool ocean water and fog. Sitka spruce forests are characteristic of this area. The average annual precipitation is 52 to 60 inches (1,320 to 1,525 millimeters) near the beach and can be as much as about 150 inches (3,800 millimeters) at the higher elevations along the inland edge of the MLRA. Most of the rainfall occurs during low-intensity, Pacific frontal storms. Precipitation is evenly distributed throughout fall, winter, and spring; summers are cool and dry. Snowfall accumulation is rare on the ocean side of this area, but some snowfall occurs along the eastern boundary. This area lies within the coastal fog belt zone, and heavy fogs are common in summer. Supplemental moisture is provided by fog condensation. Dominant soil orders in this MLRA are Andisols, Inceptisols, Spodosols, and Entisols.

Ecological site concept

Isomesic Udic Alluvial Terrace Forest sites occur on high terraces and colluvial aprons in river valleys. This site occurs in the transitional zone between floodplain forests and upland forests. Unlike the floodplain forests, flooding occurs very rarely on this site. Isomesic Udic Alluvial Terrace sites are characterized by a dense overstory of western

hemlock (*Tsuga heterophylla*) and Sitka spruce (*Picea sitchensis*). Dominant conifers are shade-tolerant and may continually regenerate in the shaded understory. The understory shrub layer is dominated by oval-leaf blueberry (*Vaccinium ovalifolium*), salmonberry (*Rubus spectabilis*), red huckleberry (*Vaccinium parvifolium*), and vine maple (*Acer circinatum*). The forb layer is typically composed of western swordfern (*Polystichum munitum*), western cordilleran bunchberry (*Cornus unalaschkensis*), twinflower (*Linnaea borealis*), threeleaf foamflower (*Tiarella trifoliata*), common ladyfern (*Athyrium filix-femina*), false lily of the valley (*Maianthemum dilatatum*), and redwood-sorrel (*Oxalis oregana*).

Associated sites

AX004A01X003	**Isomesic Udic Floodplain Forest** Isomesic Udic Floodplain Forest sites occur on lower alluvial terraces and are subject to more frequent flooding.
AX004A01X401	**Isomesic Udic Forest** Isomesic Udic Forests are upland forest sites found above Isomesic Udic Alluvial Terrace Forest sites.
AX004A01X403	**Udic Moist Forest** Isomesic Udic Moist Forests are upland forest sites found above Isomesic Udic Alluvial Terrace Forest sites.
AX001X01X200	**Temperate Wet Meadow** Temperate Wet Meadows are found on depressions and seeps adjacent to or surrounded by Isomesic Udic Alluvial Terrace Forest sites. Temperate Wet Meadow sites lack tree cover.

Similar sites

AX001X01X003	**Mesic Udic Alluvial Terrace Forest** Mesic Udic Alluvial Terrace Forest sites occur at higher elevations and lack Sitka spruce (Picea sitchensis).
AX001X01X107	**Frigid Udic Alluvial Terrace Forest** Frigid Udic Alluvial Terrace Forest sites occur at much higher elevations and support Pacific silver-fir (Abies amabilis).

Table 1. Dominant plant species

Tree	(1) *Tsuga heterophylla* (2) *Picea sitchensis*
Shrub	(1) *Vaccinium ovalifolium* (2) *Vaccinium parvifolium*
Herbaceous	(1) *Cornus unalaschkensis* (2) *Oxalis oregana*

Legacy ID

F004AA005WA

Physiographic features

This site primarily occurs on high terraces in river valleys. Isomesic Udic Alluvial Terrace Forest sites are found on higher alluvial terraces and do not receive frequent floodwater. As a result of their transitional landscape position, these forests display some character of both Isomesic Udic Floodplain Forests and upland isomesic udic forest sites.

Table 2. Representative physiographic features

Landforms	(1) River valley > Terrace
Flooding duration	Brief (2 to 7 days)
Flooding frequency	Very rare
Ponding frequency	None
Elevation	50–300 m
Slope	0–10%
Water table depth	150 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

This site occurs in an isomesic temperature and udic moisture regime. Precipitation arrives mostly via low-intensity, Pacific frontal storms. Precipitation mostly falls as rain, but some snowfall occurs along the eastern boundary of the area. Precipitation is evenly distributed throughout the fall, winter, and spring, while summers are dry. Heavy fog is very common in the summer, contributing supplemental moisture. The frost-free period of this area is strongly tied to ocean proximity; the eastern edge of the area has a significantly shorter growing season than the western edge. There is relatively little seasonal variation in air temperature due to Pacific Ocean influence.

Table 3. Representative climatic features

Frost-free period (characteristic range)	180-240 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	2,007-2,997 mm

Influencing water features

Isomesic Udic Alluvial Terrace sites are only subject to very rare flooding. Water features do not significantly influence plant community dynamics on site.

Soil features

The soils are very deep, have very high or high Ksat throughout, and are well drained. The soils are formed in mixed alluvium. The soil surface texture is Silt Loam or Loam. Clay content is eight to 17 percent throughout. The soil series for this ecological site are Mountmeany and Marymere. Although representative of this site, these soils may exist across multiple ecological sites because of naturally variable slope, texture, rock fragments, and pH. An on-site soil pit and the most current ecological site key are necessary to classify a site.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Silt loam (2) Loam
Drainage class	Well drained
Soil depth	150 cm
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	8.89–21.59 cm
Soil reaction (1:1 water) (0-25.4cm)	4.5–5.5
Subsurface fragment volume <=3" (0-50.8cm)	15–50%
Subsurface fragment volume >3" (0-50.8cm)	5–15%

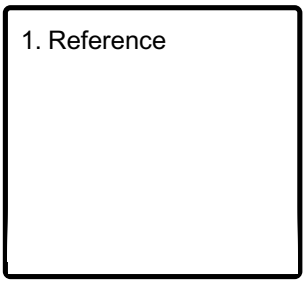
Ecological dynamics

Isomesic Udic Alluvial Terrace sites are subject to disturbance from windstorm events, wildfires, floods, and mass movement events. Windthrow may create small gaps in the overstory canopy that favor understory regeneration. Frequent windthrow creates varied-age patches of trees. Root and butt rot fungi exacerbate trees' susceptibility to windthrow. Wildfires are an additional source of disturbance, though they occur much less frequently. The fire regime of this forest type is characterized by infrequent, severe fire events. The fire return interval is very high, 100 to nearly 1,000 years (FEIS, 2012). Flooding events may occur very rarely. Since these sites are generally located on high stream terraces, a large volume of water is required for streams to overflow to this level. Alluvial terrace

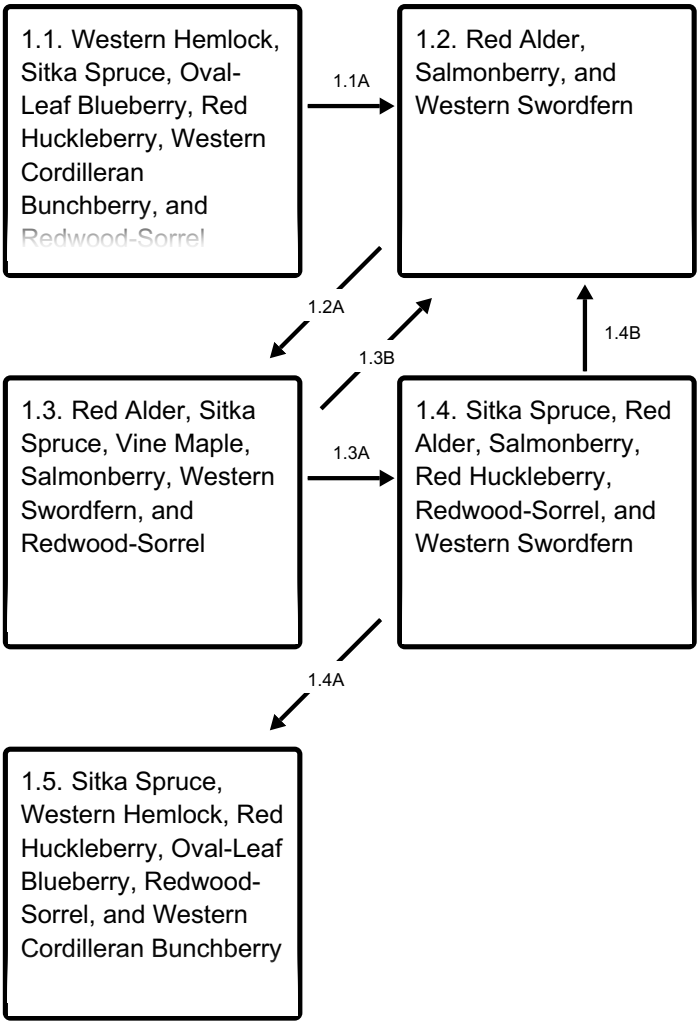
forest sites experience less than one percent probability of flooding in any year. When they do occur, intense flood events may cause tree mortality, scour the mineral soil surface, and can remove existing vegetation from the site.

State and transition model

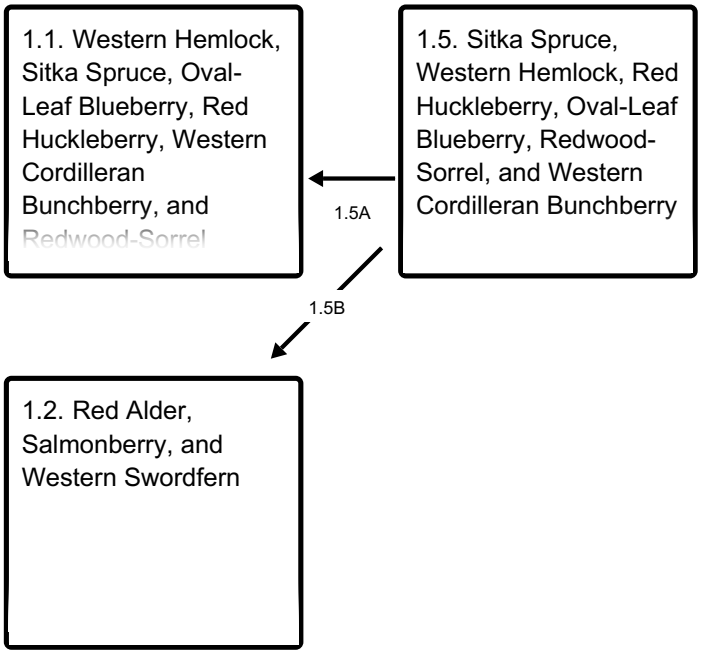
Ecosystem states



State 1 submodel, plant communities



Communities 1, 5 and 2 (additional pathways)



1.1A - High-intensity disturbance

1.2A - Time without disturbance

1.3B - High-intensity disturbance

1.3A - Time without disturbance

1.4B - High-intensity disturbance

1.4A - Time without disturbance

1.5A - Time without disturbance

1.5B - High-intensity disturbance

State 1
Reference

The reference state is comprised of five communities in varying stages of regeneration following either small-scale or large-scale disturbance.

Dominant plant species

- western hemlock (*Tsuga heterophylla*), tree
- Sitka spruce (*Picea sitchensis*), tree
- red alder (*Alnus rubra*), tree
- oval-leaf blueberry (*Vaccinium ovalifolium*), shrub
- red huckleberry (*Vaccinium parvifolium*), shrub
- salmonberry (*Rubus spectabilis*), shrub
- vine maple (*Acer circinatum*), shrub
- western cordilleran bunchberry (*Cornus unalaschkensis*), other herbaceous
- redwood-sorrel (*Oxalis oregana*), other herbaceous
- western swordfern (*Polystichum munitum*), other herbaceous
- twinflower (*Linnaea borealis*), other herbaceous
- threeleaf foamflower (*Tiarella trifoliata*), other herbaceous

- common ladyfern (*Athyrium filix-femina*), other herbaceous
- false lily of the valley (*Maianthemum dilatatum*), other herbaceous

Community 1.1
Western Hemlock, Sitka Spruce, Oval-Leaf Blueberry, Red Huckleberry, Western Cordilleran Bunchberry, and Redwood-Sorrel

Structure: multistory with small gap dynamics Western hemlock (*Tsuga heterophylla*) and Sitka spruce (*Picea sitchensis*) are the dominant tree species in the reference community. Individual mortality of mature trees creates small canopy gaps. Western hemlock (*Tsuga heterophylla*) and Sitka spruce (*Picea sitchensis*) are shade tolerant and will continually regenerate in the understory. Deciduous regeneration is generally limited to small canopy gaps. The understory is dominated by oval-leaf blueberry (*Vaccinium ovalifolium*), salmonberry (*Rubus spectabilis*), red huckleberry (*Vaccinium parvifolium*), vine maple (*Acer circinatum*), western swordfern (*Polystichum munitum*), western cordilleran bunchberry (*Cornus unalaschkensis*), twinflower (*Linnaea borealis*), threeleaf foamflower (*Tiarella trifoliata*), common ladyfern (*Athyrium filix-femina*), false lily of the valley (*Maianthemum dilatatum*), and redwood-sorrel (*Oxalis oregana*).

Community 1.2
Red Alder, Salmonberry, and Western Swordfern

Structure: sparse understory of emergent shrubs, forbs, and grasses This community follows a stand-replacing disturbance event. Red alder (*Alnus rubra*), salmonberry (*Rubus spectabilis*), and western swordfern (*Polystichum munitum*) quickly establish where the canopy has been removed.

Community 1.3
Red Alder, Sitka Spruce, Vine Maple, Salmonberry, Western Swordfern, and Redwood-Sorrel

Structure: shrubby single story with scattered understory of trees, shrubs, forbs, and grasses This community follows the initial phase of regeneration post-disturbance. As time progresses, bigleaf maple successfully establishes. The shrub and forb layers gradually diversify as slow-growing species begin to regenerate.

Community 1.4
Sitka Spruce, Red Alder, Salmonberry, Red Huckleberry, Redwood-Sorrel, and Western Swordfern

Structure: deciduous forest with a mix of shrubs, forbs, and grasses, with conifer regeneration in the understory Black cottonwood (*Populus balsamifera* ssp. trichocarpa) and Sitka spruce (*Picea sitchensis*) recruits have established on the site and largely replaces red alder (*Alnus rubra*). Vine maple (*Acer circinatum*) is a significant understory

shrub component in this community.

Community 1.5
Sitka Spruce, Western Hemlock, Red Huckleberry, Oval-Leaf Blueberry, Redwood-Sorrel, and Western Cordilleran Bunchberry

Structure: single story with few small openings In this community, western hemlock (*Tsuga heterophylla*) has become a subdominant tree species and will continually regenerate in the shaded understory. The canopy consists mainly of a single, dense layer. The dense canopy results in lowered understory productivity relative to the reference community. As time progresses, individual tree mortality and small-scale disturbance will act on the site to create canopy gaps and increase vertical stratification.

Pathway 1.1A
Community 1.1 to 1.2

Stand-replacing disturbance events such as high-intensity fire, catastrophic windstorms, and floods open the forest canopy and lead to the stand initiation phase of development.

Pathway 1.2A
Community 1.2 to 1.3

Time without disturbance allows regeneration, growth, and progression to a later seral stage.

Pathway 1.3B
Community 1.3 to 1.2

Stand-replacing disturbance events such as high-intensity fire, catastrophic windstorms, and floods open the forest canopy and lead to the stand initiation phase of development.

Pathway 1.3A
Community 1.3 to 1.4

Time without disturbance allows regeneration, growth, and progression to a later seral stage.

Pathway 1.4B
Community 1.4 to 1.2

Stand-replacing disturbance events such as high-intensity fire, catastrophic windstorms, and floods open the forest canopy and lead to the stand initiation phase of development.

Pathway 1.4A

Community 1.4 to 1.5

Time without disturbance allows regeneration, growth, and progression to a later seral stage. Individual tree mortality creates small canopy openings.

Pathway 1.5A
Community 1.5 to 1.1

Time without disturbance allows regeneration, growth, and progression to a later seral stage. Vertical stratification increases and forb diversity increases. Individual tree mortality creates varied-age patches.

Pathway 1.5B
Community 1.5 to 1.2

Stand-replacing disturbance events such as high-intensity fire, catastrophic windstorms, and floods open the forest canopy and lead to the stand initiation phase of development.

Additional community tables

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Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	03/17/2026
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile**

features which may be mistaken for compaction on this site):

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

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17. **Perennial plant reproductive capability:**
